author's experiences in Korea are not the least interesting part of the book. Korea proves a most successful mission field in the East. The annual native contribution to the missions is estimated at 25,000*l.*

The quaint city of Seoul, under Japanese rule, leaves no doubt in the minds of visitors of the thoroughness of their governing methods as carried out in minute detail. One of the most serious losses sustained by the Koreans was the death of the wise Prince Ito, their governor. It was discovered when the murderer of the Prince was condemned to death that he was writing a poem, and the Japanese judge with grim humour, or Confucian regard for literature, granted him ten days' grace in order that he might finish the effusion.

We must now leave the reader to follow the author through Russian Turkestan, and in connection with this part of the route he might consult Dr. Stein's account of his recent exploration and wonderful discoveries in the Turkestan desert, and Mr. Carruthers's recent survey in the mountain region peopled by the Kurghiz. The author's attractive sketches add to the value of the book.

J. T.

VARIABILITY IN "LOWER" ORGANISMS.

Die Variabilität niederer Organismen. Eine deszendenztheoretische Studie. By Hans Pringsheim. Pp. viii+216. (Berlin: Julius Springer, 1910.) Price 7 marks.

THIS book is an attempt to analyse and correlate the known facts regarding variations in certain so-called "lower" organisms. Among these, the Bacteria occupy the chief place, although the Fungi—especially the Saccharomycetes—and the Protozoa are also considered to some extent.

To anyone acquainted with the present state of the literature of this subject, it is unnecessary to point out the difficulties entailed in writing a book of this sort: yet from the admirably clear and concise manner in which the author has presented the facts, the average reader will obtain but a very faint idea of the large amount of patient labour which has been devoted to the task. Perhaps no greater praise could be given to a work of this sort—a work which is unique in that it attempts to correlate the variability of unicellular organisms with that of "higher" forms, and thus to supply biological facts in place of the *a priori* notions which are usually given regarding the "lower" organisms when considered in relation to the theory of organic evolution.

As a compilation of facts, the work leaves little to be desired. The omissions are, for the most part, unimportant. With the author's analysis and interpretation of the facts, however, we by no means always agree: but it is impossible to discuss these properly in a few words, as almost every paragraph in the analytical sections contains a significant idea. By the admirable method which the author has adopted of relegating the literature references and details to a separate section—thus eliminating a large mass of facts of great, but secondary, importance from the main body of the text—a very clear and readable statement of the facts and arguments has been achieved.

The author begins with a brief consideration of the significance and causes of variability in general, and of the heritability of variable characters. It may be noted that the term *mutation* is rejected, and the variations of "lower" organisms are designated *fluctuations,* when they arise from internal causes, and *adaptions* (*sic*) or *accommodations,* when they are called forth by external influences. After some discussion of the struggle for existence in "lower" organisms, and of the limits within which variations occur, the author passes to an enumeration of the observed facts regarding variations in these forms.

As already noted, most of the facts are derived from the Bacteria. They therefore relate chiefly to physiological variations. The author describes variations in colony formation, optimum growth temperature, motility, spore formation, metabolism, ferment and colour production, virulence, and a number of other variable characters. Morphological variations—arising naturally, from innate and unknown causes, or produced by temperature changes, poisons, &c.—are also briefly considered: but pleomorphism is dismissed in a few words, as the author regards it as a normal event in the life-cycle of those forms which display the phenomenon, and therefore properly to be eliminated from a discussion of true variations.

The author's general conclusions naturally constitute the chief feature of interest in the book. He believes "that all the observed cases of variability in micro-organisms may be interpreted as fluctuating variations" (*i.e.* arising from unknown and innate causes) "and functional adaptations": and further, that "there are heritable and non-heritable fluctuating variations in micro-organisms, just as in highly developed animals and plants."

Finally, the author considers the bearing of the facts upon Weismann's view of the relation between amphimixis and variability. From the recorded observations on the variability of "lower" organisms, he concludes that no reasonable grounds exist for supposing that amphimixis causes increased variability in the organisms possessing it, because a high degree of variability is found in non-sexual "lower" organisms which multiply by simple fission.

"One of the chief advantages of amphimictic reproduction is the exclusion of the inheritance of acquired characters and the enforced equalisation of the variable characteristics of special individuals."

A detailed criticism of this important work is not possible in the short space allotted to the present review. We would point out, however, that our chief personal criticism concerns the author's point of view—implied in the title of the book, and impressing itself upon all the author's biological ideas. We do not regard the so-called "lower" organisms as beings which are nearer the beginnings of life than the so-called "higher" forms. The Protista—even the Bacteria—display considerable morphological differentiation, and a physiological complexity which is not "low" in any sense. We believe that a much profounder analysis of fundamentals is required than that given in this book. It is also our opinion that the

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non-sexual nature of unicellular organisms—tacitly assumed by the author—must be considered in an analysis of this sort. The majority of Protozoa present sexual phenomena in their life-histories, and sexual processes also occur in many yeasts. Although we believe that the Bacteria are truly non-sexual, we think that the possibility of amphimictic processes occurring in this group should at least have been considered, as a certain amount of work has already been published in this connection.

C. CLIFFORD DOBELL.

BIOCHEMISTRY OF FATS.

Monographs on Biochemistry. Edited by Prof. R. H. Aders Plimmer and Dr. F. G. Hopkins, F.R.S. The Fats. By Prof. J. B. Leathes. Pp. ix+138. (London: Longmans, Green and Co., 1910.) Price 4*s*. net.

PROF. LEATHES'S former book on the "Problems of Metabolism" proved him to be a writer with originality in his views and a capacity for stating them in a lucid and convincing manner. One therefore turned to his long-promised monograph on the fats with considerable interest, especially as the subject is one to which he has devoted so much experimental research work.

The first hundred pages are devoted to a description of the chemistry of fats and their constituents, and the various methods for separating, identifying, and analysing them. This section of the book is useful and necessary; the facts, moreover, are clearly put and well arranged. But this laying of the foundations affords little scope for the thinker, and no doubt could have been equally well done by any competent chemist. The real interest of the book is the superstructure built upon this, namely, the chapter on the physiology of the fats, and one's only regret is that it occupies only eighteen pages. Here the author is able to display his gift of making the dark ways of metabolism as plain as is possible with our present knowledge, and in suggesting explanations and stimulating research on the questions which are still largely hypothetical.

One word of criticism of a quasi-adverse kind appears to be necessary, and that relates to what, after all, is not the most important matter, namely, that of nomenclature. The Chemical Society has laid down certain rules for nomenclature in order to ensure uniformity among English-speaking chemists; such terminations as in, ine, ol, ole, ase, &c., have definite meanings assigned to them, and surely all writers should endeavour to follow the laws put forward by the society, which occupies the foremost place in the chemical world. Prof. Leathes, however, speaks of lecithine, cerebrone, nucleine, jecorine, &c., and the substance he terms phlorrhizine is recognisable, though this spelling does not occur so far as one knows in any other English chemical book.

He has also introduced an entirely new nomenclature for the principal lipoids, the phosphatides being dubbed phopholipines, the galactosides galactolipines, and the basic constituents of galactosides lipines.

A new nomenclature is always sure to cause confusion, especially among students, and so should never be introduced without careful consideration and with some prospect that it will at once "catch on," because it is manifestly appropriate. Prof. Leathes has no doubt very carefully considered his new terms, and everyone will agree with him that the existing terminology leaves much to be desired; but it is very doubtful whether his new terms are better than the older provisional names. The chemical constitution of most of the substances in question is still a matter of doubt and speculation. The proper time to introduce new names will be when their constitution is fully known, and terms can then be framed which will express their structure with accuracy. At present Prof. Leathes has only introduced a new set of provisional names, which, like the older ones, will disappear when our knowledge is more exact.

W. D. H.

BIRD OBSERVATION.

Unleitung zur Beobachtung der Vogelwelt. By Dr. Carl Zimmer. Pp. iv+134. (Leipzig: Quelle and Meyer, 1910.) Price 1.25 marks.

THE author of this work is Dr. Zimmer, keeper of the Royal Zoological Museum in Breslau. On the first zoological excursion he undertook with his pupils in the university of that town (where he is also lecturer, as well as museum custos) they fell in with a chaffinch singing in a tree. On his demanding from them the name of the songster, the word "nightingale" was ventured on after a prolonged silence! The little episode, which indicated, to his surprise, their lamentable lack of knowledge of the commonest local birds, induced Dr. Zimmer to prepare this *büchlein* as an introduction to ornithological observing. In some respects it reminds one of the section in "Hints to Travellers," issued by the Royal Geographical Society on the same subject, though directed to a somewhat different class of observers. One, however, lays the book down with the somewhat unsatisfactory feeling that it is assumed that the student will be *made* into an ornithologist by following the instructions—all of them excellent and the result of experience—therein contained, rather than that the observer, who must be born so, and is already, if that be his bent, an ornithologist, in embryo, before he is aware of it, requires proper guiding only.

Many of Dr. Zimmer's hints will assist in directing the young ornithologist's earlier methods, and suggesting interesting lines of observation, and so will be of considerable value. After some words of introduction, the author gives a list of helpful books on ornithology, especially those with good illustrations, in English as well as German. His next section deals with the subject of excursions into "the open" in quest of birds in their wild state—"the study of cage birds is a make-believe"—and the periods of the day when they can be observed to most advantage. The most suitable field-glasses for the purpose are described.

The larger portion of the book discusses bird life at the different seasons of the year, and directs atten-

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